

# Jet User Manual

|                                           |                                                                                      |
|-------------------------------------------|--------------------------------------------------------------------------------------|
| Jet manual is based on Jet Middleware ver | 1.2                                                                                  |
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| Jet copyright and license                 | 2008, Avalpa Digital Engineering SRL, GPL v2.0 or later                              |
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| document release                          | 0.4                                                                                  |
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| Avalpa Logo                               |  |

For [DgStation 250 and 350](#) decoder:



Jet user manual

Dedicated to Anna & Asli

Thanks to:

bæssnet

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## Introduction

**Jet middleware** is an open source software that gives a cleaner approach to the standard digital television decoder, also known as a set top box (STB) for enhanced television.

As enhanced television we mean a set of features like applications (games, services), or advanced informations, empowering the user **without disrupting traditional usability**, leveraging computing capabilities already present in the STB.

Traditional decoders suffer of at least two different diseases: they can be usable and light but are closed and not driven by user demands, or they can be open and free but designed with lot of good-willing but without a clear design and a committed steering board.

Jet would like to overcome those limitations and strive to give users a comfortable interface to digital television features and perform smoothly all the tasks that today digital convergence promises.

Avalpa Digital Engineering Srl is proud to provide you with this choice and invite everyone to use it for entertainment or for business purposes, to suggest and signal potential advancement, new useful features, improvement in usability and weak points too (software is always bug-full).

We value your opinion: please write to [suggestions@avalpa.com](mailto:suggestions@avalpa.com), we'll reply.

## Copyright and warranty

**Jet middleware** is Copyright (C) 2008 by Avalpa digital Engineering SRL.

**Jet middleware** is free software; you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation; either version 2 of the License, or (at your option) any later version.

The **Jet middleware** is distributed in the hope that it will be useful, but **WITHOUT ANY WARRANTY**; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details.

You should have received a copy of the GNU General Public License along with the **Jet middleware**; if not, write to



the Free Software Foundation, Inc., 51 Franklin St, Fifth Floor, Boston, MA 02110-1301 USA

### ***How to read the manual***

This manual strive to provide complete instructions for installing and using Jet software.

You can find some action described and the relevant keys should be signed clearly this way: **Red Button**

The following symbols will serve as follow:

| Symbol                                                                              | Description                                                                                                |
|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
|    | Pay attention to this note, it should be a hint for a smarter usage of the software                        |
|    | Beware, you can get some undesirable effect if you don't understand instructions and follow them carefully |
|  | Help! This part is not completely up to date or finished; maybe you can help us, would you like?           |

## Jet description and features

Jet is written mainly in Java language and some C code and is composed of two main blocks:

- The Graphical Application (GA) that accomplish the man machine interface between user and decoder.
- The Jet Libraries (JL) that are providing to the GA and other interactive applications an interface to hardware systems and service informations through an API.

Jet is running on top of a [GNU/Linux](#) distribution customized for the underlying hardware and a [Java](#) virtual machine [PhoneMe Advanced](#) released with a [GPL License](#) from [Sun Microsystems](#) in December 2006.

You are invited to read the **Jet developer manual**, to learn more about the internals of Jet and future features.

Of course the basic feature of this software, provided you are using it on a supported device, is to let you browse television programs in a smooth and comfortable way.

Then, there are already plenty of features already available on Jet, some are easy to use, some are advanced (it strictly doesn't mean complicated or cumbersome, but just a bit more complex than usual..) and some are hidden (because they are not ready today for the casual user).

We plan to extend the document, when these features will be released in next software versions.

Of course we have our own roadmap (based on marketing decisions and actual customers), but **you can express your interest and vote for it**, we could find your suggestions useful and implement it.

Actually this software is running on already available Set Top Box like DGStation Cubecafe 250 and 350 Prime with the following hardware features:

| Hardware Feature | 250                   | 350                   | Note                                                    |
|------------------|-----------------------|-----------------------|---------------------------------------------------------|
| Processor        | IBM PowerPc           | IBM PowerPc           | System on chip Vulcan ST25xx                            |
| Flash Memory     | 16MB                  | 16MB                  | Both for firmware and persistent info                   |
| Ram              | 64MB                  | 64MB                  | Actually splitted in 32MB for processes and 32 for swap |
| Resolution       | Standard Definition   | Standard Definition   | SD PAL 720x576                                          |
| Video Decoder    | <a href="#">MP@ML</a> | <a href="#">MP@ML</a> | 1-15 Mbps                                               |
| Audio Decoder    | Mpeg Layer 1,2,3      | Mpeg Layer 1,2,3      |                                                         |
| IP connection    | Ethernet port         | Ethernet Port         |                                                         |
| DVB tuner        | DVB-S                 | DVB-S or <b>DVB-T</b> |                                                         |

|     |   |                 |  |
|-----|---|-----------------|--|
| USB | - | USB version 1.1 |  |
|-----|---|-----------------|--|

Other decoders will be supported depending on time, interest and other constraints or opportunities.

## ***Main features***

The basic features you can count on today are the following:

- navigation with remote control with on screen display (OSD) interface
- scan for services on air (at first time power on or on demand)
- save found services in memory (with some list editing functionalities)
- browsing through available services (video and main audio)
- manually exchange position in the saved list
- see info about the running event and next (if broadcast from network)
- on the air upgrade through internet connection (to make an easier path during these high-paced development phases)

## ***Advanced features***

Some advanced features are already available in this version and can be seen as a clear proof for much more to come:

- one key recording of displayed program (just press the **red button**)
- programmed recording of events
- playback of recorded events (with management functions like deletion)
- ethernet connection (actually for system administration, access to hidden features, debugging and xlet communication)
- DSMCC data carousel decoding
- interactive application (xlet) execution environment (supporting a simple but fully functional API described in the **Jet developer manual**)
- bidirectional communication channel through ethernet/xDSL or wireless through USB serial modem / GSM (with optional external device, not configured through actual GUI)

## ***Nice to have features planned***

These features are described here in no particular order, just for you to get an idea of what we are thinking of. If you see something missing, don't hesitate to tell us writing at [suggestions@avalpa.com](mailto:suggestions@avalpa.com)

- volume control with the remote
- some proprietary crypted service support

## Jet user manual

- streaming on LAN
- playback of recorded events from other LAN server (UPnp)
- distributing/receiving content through bit-torrent technology
- recording and playing from USB storage
- smart card access for interactive applications
- and many more we can just dream of!

Of course, **Avalpa is ready to be hired** to develop in a timely manner these features or other for business purposes. That's our business model. Please contact [biz@avalpa.com](mailto:biz@avalpa.com) to check for partnership.

## Intended usage and scenario description

Actually this project is running on a fast lane and many details are changing quickly so you can find that real things are a bit different then what's described here and maybe you need to do a bit of guesswork to achieve the result.

If you happen to be confused and see some discrepancy between software and manual please report to [bugs@avalpa.com](mailto:bugs@avalpa.com) so we can close the gap. Thanks.

We are thinking of this software for two tasks.

Basically it should quickly become a running and functional environment for digital television decoders, useful for simple zapping, as a personal video recorder (with an optional hard disk inside the box) and for many fancy and interactive applications (if depends on broadcaster to put on air them..)

But we are also envisioning it to become a platform for a wealth of new enhanced digital services to be performed through the familiar tv set and the door of a true digital convergence in digital citizen living room.

If you are a standard user, you can help us using it and telling us what's very right (i.e. Better then usual..), what's standard and what should be improved as soon as possible (otherwise you'll change your vendor!)

If you are a professional (like a software developer, a content producer, a broadcaster), we welcome you too and ask you to join us, and help this free software become the better platform for modern, dependable enhanced television services.

You can make the difference; please read the **Jet advanced manual** too, the web page at [www.avalpa.com](http://www.avalpa.com), join the community subscribing to the mailing list and keep us busy listening your proposal and checking-in your patches!

## How to start now

It's already very easy and not expensive to step in and begin getting involved in this amazing world of enhanced television. You can become quickly acquainted to the slim user interface and natural usability of the system and soon you'll not want to use anything else.

### Hardware

First, you need to get a device. Actually Jet works on a selected number of decoders made from [DgStation](#) and called CubeCafe 250 and 350: both do have the same CPU and internet capabilities, but the main difference between the two is that the 350 can have alternatively a DVB satellite or terrestrial tuner (the 250S is satellite only) and the USB port (the 250S is missing any USB port) that **can lead** to many many more features (of course with optional hardware) so it's more future proof (albeit it's just a 1.1 version USB so **not High Speed**)



These Dgstation Cubecafe are already available through italian resellers. You can find many on the internet using your preferred search engine.

### Software

Then you need to execute a version of the Jet software. You could get this software in many different ways:

- Jet is already installed on the decoder: you are a lucky guy, you can skip next paragraphs and some tedious and error prone work and start to play with it. Please read **First time configuration** chapter
- You need to download Jet from internet and install it. Please follow carefully next paragraph indication. This is only a one time hassle. We have implemented and tested the procedure for an easy upgrade of a Jet running decoder using the onboard internet connection so you “should” never need a computer next to the box

## Jet Installation & upgrade

Unluckily, today, you can't find on sale box with already Jet on board, so you need to upgrade your box manually and it this is a bit of tedious and risky procedure.



**Disclaimer! We don't warrant you will succeed. You are doing everything on your own. If you don't know what you are doing, please step down NOW.**

Beware, this procedure can be risky for your box, if you fail, you could brick your box (and you should need to use more complex procedures involving special cables like JTAG to recover)

### *Jet manual install*

So you decided to give Jet a try! Right? Fine..

Here, there are the few steps you need to accomplish to setup Jet for the first time:

- First, you should have a PC with a serial port and a null modem serial cable linking the PC with the DgStation Cubecafe.
- Get from [here](#) and install the ABCOM Flash Tools 1.0.2 (latest release these days)
- Download latest **serial\_all.jet image** from [Avalpa Web site reserved area](#) (you'll need to subscribe for a free password).
- Execute Flash tool and select the serial\_all image
- Power up the CubeCafe 350 Prime and press down the OK button on the front until **Flash tool** says "downloading"
- Wait until upgrade phase ends (Flash tool pop up a windows..) and then reboot the STB

This is how things should go the right way, this is the very same procedure you should do with these STB if you want to install a different firmware and so you can use it also to come back to your preferred image if Jet will not satisfy your expectation and requirements (we'd like to know if and what we can improve to make Jet your preferred image for DgStation; so please write us to [jet-support@avalpa.com](mailto:jet-support@avalpa.com) ).

If you need some more info, please read the old notes about JTVOS until they are still here: <http://jtvos.cineca.tv/>

### *Jet upgrade*

It's really easy upgrade your box firmware. You just need to go to the **Upgrade menu** in the box config area and the box itself will try to find a newer version if available and upgrade itself.

By the way, we hope to make available very soon much improved firmwares with many more fancy features. Stay tuned.

## First time configuration

Now you are ready to play with all the fancy features of Jet, the environment for the next generation digital television!

With few steps you can configure your decoder and quickly enjoy the beautiness of digital television. Let's hope you'll like the broadcaster services!

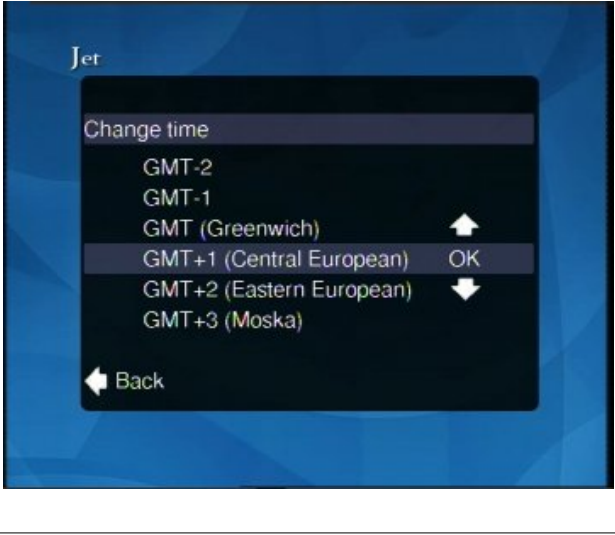
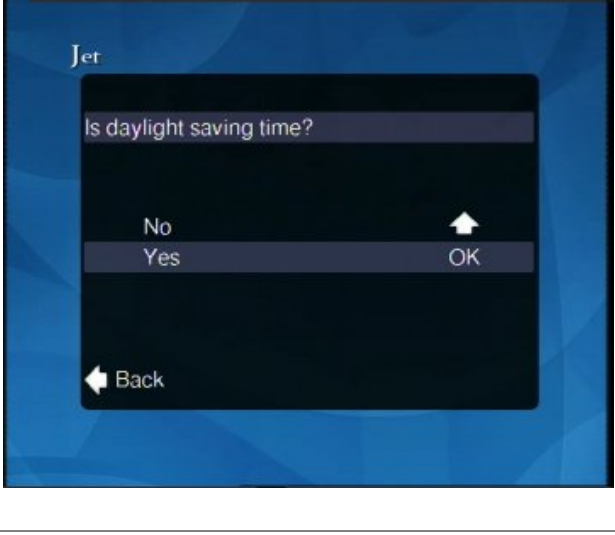
Beware, for an effective configuration, pay attention to decoder cabling (please check Appendix A) and context. There are two relevant external things to check:

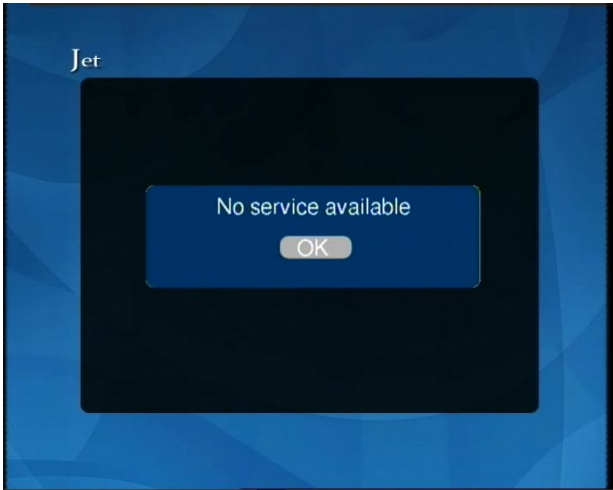
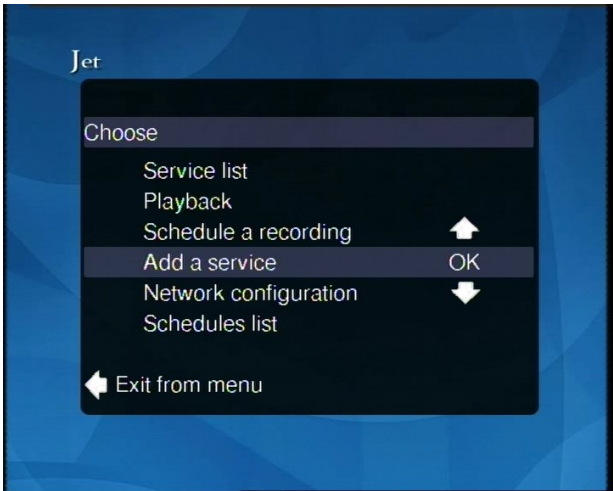
- a proper setup of the antenna matching the tuner present in the decoder (both in case you are looking to see satellite or terrestrial services)
- some broadcaster is serving free to air programs.

These are quite natural requirements, of course, but there could be some subtle details like, for example, the need of a different antenna orientation to get all digital terrestrial signals because in 2008 are still in the middle of a television switch over that has some drawbacks.

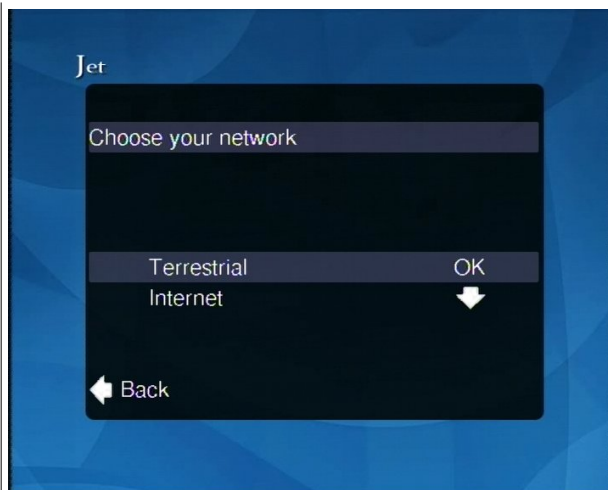
During the first time configuration you are going thru a simple but effective wizard on the screen. You can control the menu with just the arrow keys and the OK button on the remote control (to learn more about the remote please check Appendix B)

| Description          | Image                                                                                | Note                                                                                   |
|----------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| Light up the decoder |  | This splash screen show Avalpa Logo. Wait some time to get to the configuration wizard |

|                                                                                                                                                   |                                                                                      |                                                                                                                                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Language Choice</p>                                                                                                                            |    | <p>Actually we do have three supported languages:</p> <ul style="list-style-type: none"> <li>• English</li> <li>• Italiano</li> <li>• Turkey</li> </ul> <p>More are coming.</p> |
| <p>Chooss the right distance of your local timezone from Greenwich.</p>                                                                           |   | <p>There are some hints like Central Europe, for you to help in the choice.</p>                                                                                                 |
| <p>Daylight savings<br/>This is a necessary step because we want the time be correct in your local timezone with regard to event registration</p> |  | <p>Daylight saving is the condition when in your country, there's a one hour switch from solar time to legal time to make the best usage of the longer daylight.</p>            |
| <p>Time setting;</p>                                                                                                                              |                                                                                      | <p>Here you need to set up the actual time using the arrow keys.</p>                                                                                                            |

|                                                      |                                                                                      |                                                                                                                                                                         |
|------------------------------------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                      |    | <p>This setup is always needed after a cold power-on because this decoder sorely misses a battery for continuous time.<br/>Let's hope to solve this glitch someday.</p> |
| Blank decoder: no service available                  |   | <p>Now it's time to get to service search; press OK on the remote and you'll go in the main menu</p>                                                                    |
| Get down in the main menu and choose "add a service" |  | <p>You need to press down arrow.</p>                                                                                                                                    |

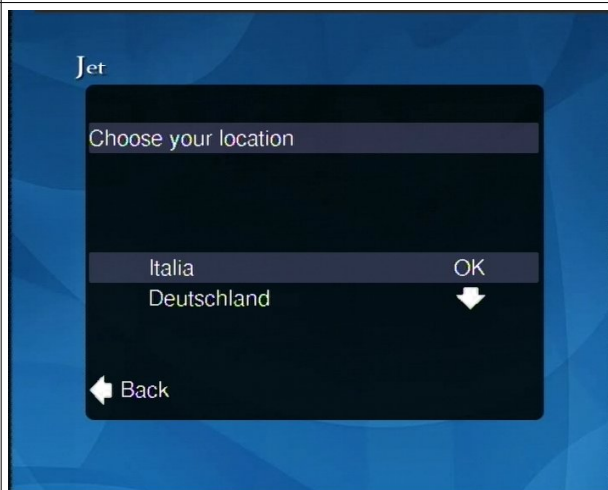
Now you need to select if you want a terrestrial network scan or input an IP tv URL.



BTW, in this version IPTV services are not

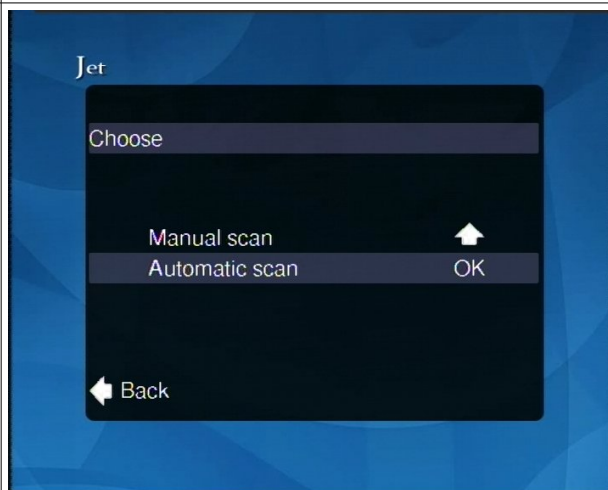
supported. You'll find satellite, in place of terrestrial, if you have a DVB-tuner inside your box.

Choose the network configuration depending on your location.



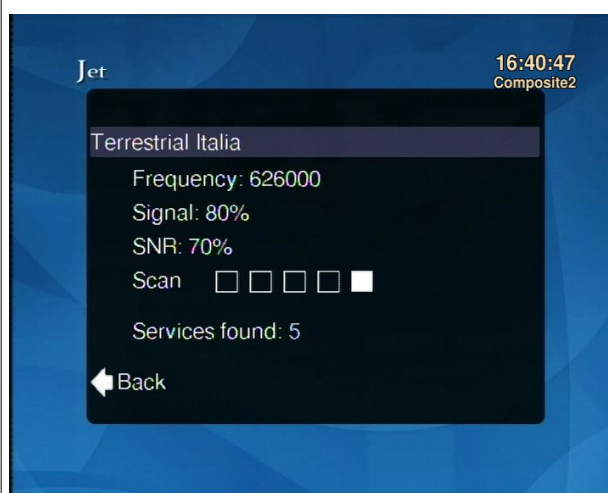
You can help us, if you want to support your country. Please write to [support@avalpa.com](mailto:support@avalpa.com)

Choose if you want to scan the whole range of frequencies or just a single channel



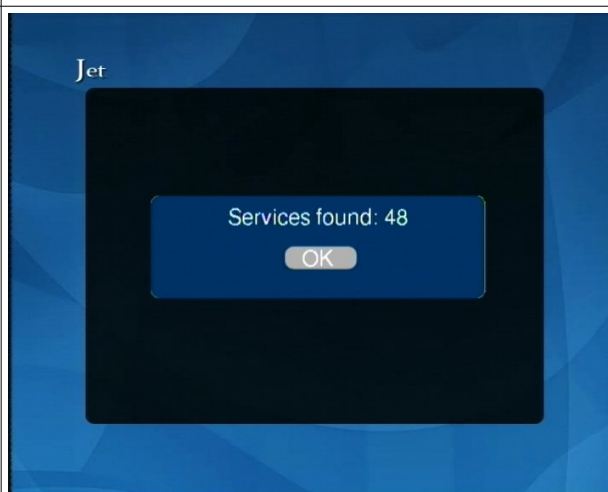
The first time, it's better to search the whole range. Later you could just search for special services on selected channels, or do another full search.

## Frequency scan



You can see some indicators, about signal strength (could be related to analog tv signals, so it's not that meaningful) and SNR (higher is better). Below, you see a counter showing the services found on that frequency. Actually IT'S NOT a total counter!

## End of scan and saving programs



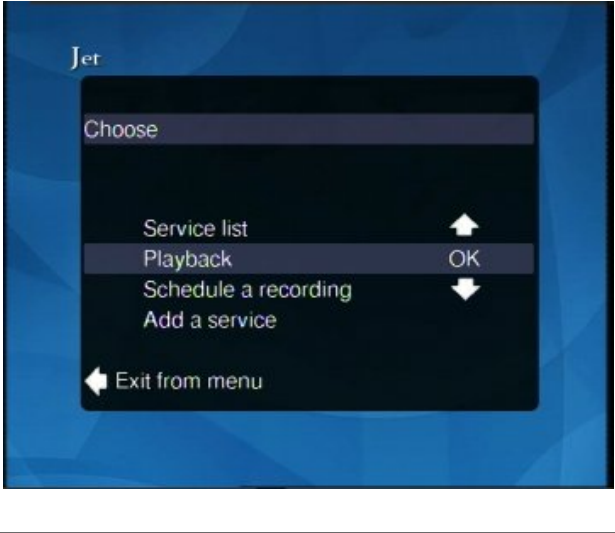
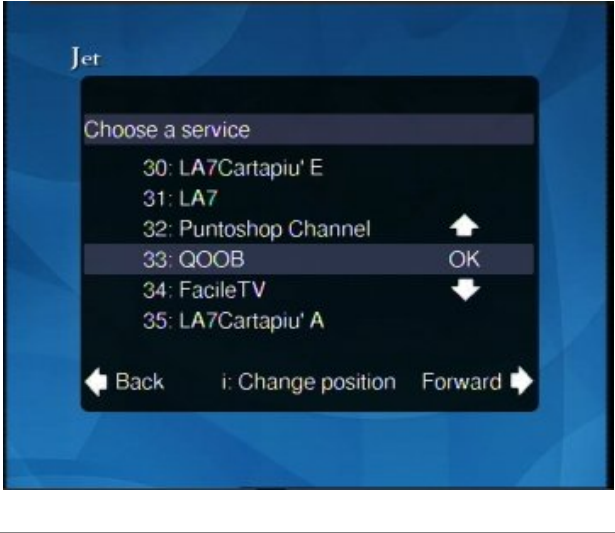
With this last step, you end the first time wizard and get to a functional decoder. We hope you have found many programs in your setup!

After the first time installation, you should be able to enjoy at least some good time with the programs on air.

## Daily Usage

Now it's time to get accustomed to the basic daily routine for this decoder

|                      |                                                                                     |                                                                                                                                                                                                                                                                                                                                |
|----------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Light up the decoder |   | <p>This splash screen show Avalpa Logo. Wait some time to get to some few basic question on time. Sorry they are needed today, because there's no persistent time between cold boots.</p>                                                                                                                                      |
| Time setting         |  | <p>Here you need to set up the actual time using the arrow keys.</p> <p> This setup is always needed after a cold power-on because this decoder sorely misses a battery for continuous time. Let's hope to solve this glitch someday.</p> |

|                                                                                |                                                                                      |                                                                                                                                                                                                                                                                                   |
|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Last program viewing</p>                                                    |    | <p>After the boot, the decoder shows back the last selected program.</p>                                                                                                                                                                                                          |
| <p>During service view, pressing the Menu button bring to Main menu</p>        |   | <p>Here you can move the cursors with the arrows to get to the main task you are looking for:</p> <ul style="list-style-type: none"> <li>• choice another service from the list</li> <li>• playback a recorded program</li> <li>• program a delayed recording</li> </ul>          |
| <p>During service view, pressing the OK button brings to Service Selection</p> |  | <p>Here you can move through service list, and choose a different service. Pay attention, here you can:</p> <ul style="list-style-type: none"> <li>• change position between services using the <i>i</i> key.</li> <li>• Come back to the Main Menu using the left key</li> </ul> |
| <p>During service view, press the <i>i</i> key to get some info about</p>      |                                                                                      | <p>Here you can see the event information on the bottom line (if</p>                                                                                                                                                                                                              |

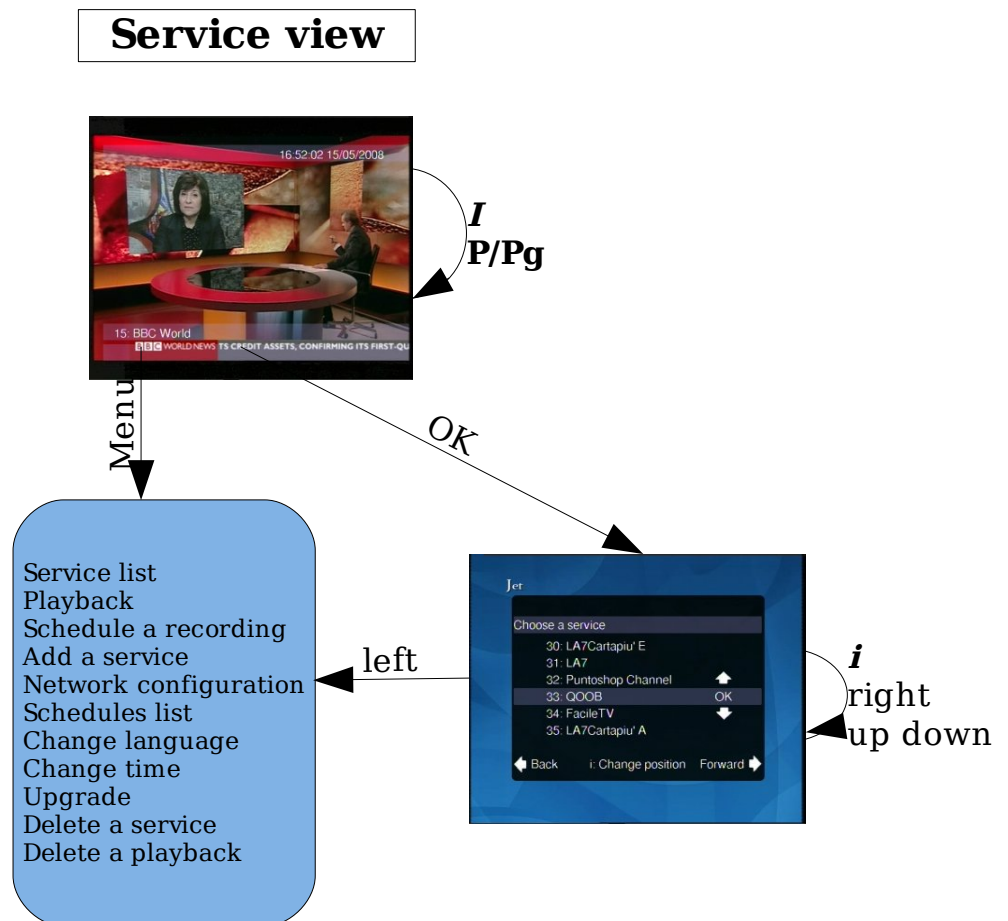
the program



present on the broadcast) and the time of the day on the upper line of the OSD

## Decoder state machine..

Here a basic representation of keypressing and changing decoder state

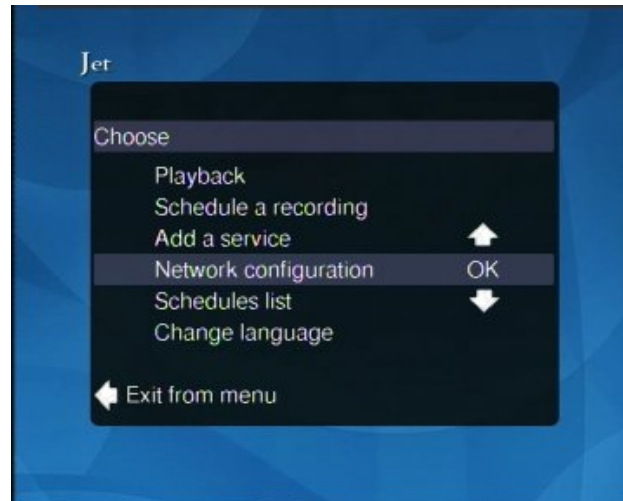


## System configuration

Sometimes you will do some management of your STB, like setting time, network interface, upgrade and so on; here we explain the most frequent activities that are exposed through the graphical interface.

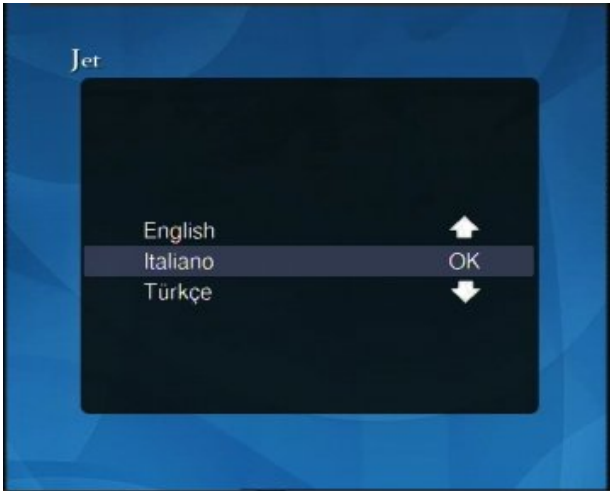
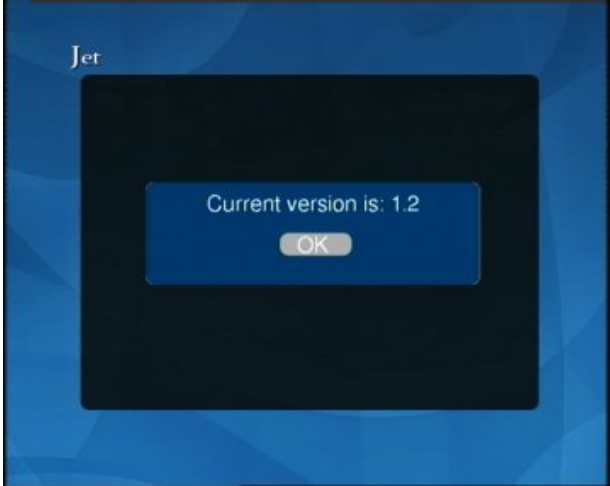


You'll find some more stuff in the **"Access to internal resources" chapter** but, pay attention: if you don't know what you are doing, you could compromise the STB and maybe you'll need to recover with a fresh install of new firmware!



Let's see a comprehensive list of the management features actually available from the Main Menu (in a next release, we plan to properly move these options in a **System Configuration** Menu):

| Option                | Screenshot | Note                                                                                                                                     |
|-----------------------|------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Network configuration |            | Here, you can see the IP address your box has got automatically from the newtwork, or through a local IP config, during first time boot. |

|                        |                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Change language</p> |    | <p>Here, you can choose between the available localization languages.</p> <p> If you see that your language is missing, you can help us localize for your country: please write to <a href="mailto:languages@avalpa.com">languages@avalpa.com</a></p>                                              |
| <p>Change time</p>     |   | <p>Here, you can modify three time settings:</p> <ul style="list-style-type: none"> <li>- timezone: i.e. distance from greenwich meridian, depending on your country</li> <li>- daylight savings, i.e. the one hour offset, depending on the country and season</li> <li>- date and time (FIX: we plan to propose the last time and not the starting one 00:00 01.01.2008)</li> </ul> |
| <p>Upgrade</p>         |  | <p>Here, you check the current version and can check for newer releases and upgrade through an internet connection. (We plan to set up also an upgrade through the broadcast solution..)</p>                                                                                                                                                                                          |

## Special Features

Here we are speaking of special features that are more advanced and a little bit tricky. But don't be scared, they are quite usable, easily explained and rightly represent the juice of this digital television decoder. You shouldn't miss them!



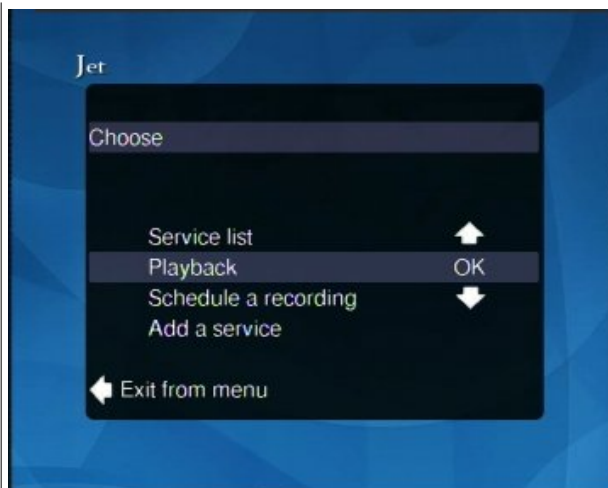
Beware: the recoding of events needs an persistent storage like an hard disk that could be optional in your device. Check this before try the PVR feature, otherwise you'll get unexpected results.

### ***PVR: event recording and playback***

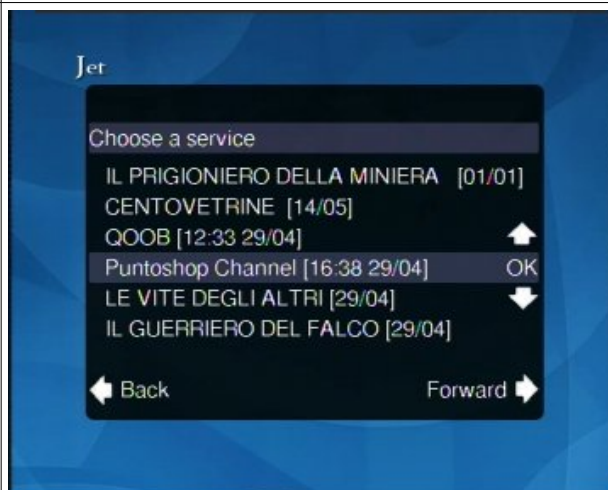
|                                                                                             |                                                                                      |                                                                                                 |
|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| <p>During service view, press the <b>red button</b> to record this program immediately!</p> |   | <p>As a feedback of this action, you can see <b>Rec On</b> stamp on the top line of the OSD</p> |
| <p>Press rec again to stop the registration</p>                                             |  | <p>Here you don't see on the top line the Rec On mark.</p>                                      |
| <p>To play back on tv one of the recorded streams, you need to get to the Main</p>          |                                                                                      | <p>Select the Playback task with the down arrow.</p>                                            |

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Menu pressing the Menu button



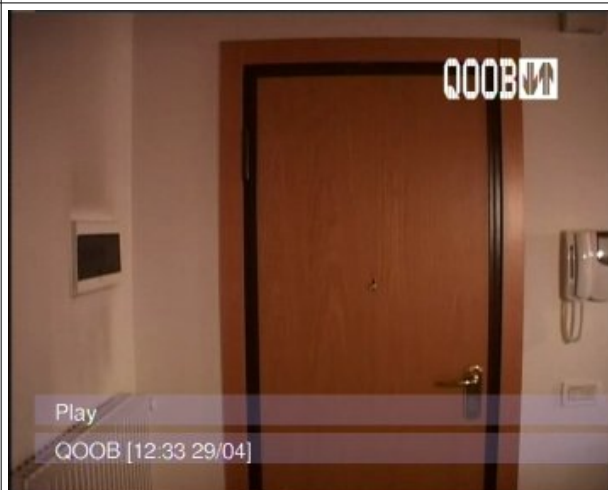
Now you can select one of the many recorded events



Move on the list with the arrows, select with OK.

**Pay attention**, when the Playback is ongoing, you can end it, only with the **Exit button**.

Playback of a recorded event



You can see the Play stampin first of the two bottom info lines.

**Pay attention**, when the Playback is ongoing, you can end it, only with the **Exit button**.

## Interactive applications (xlet) execution

Actually the main feature of this open source and free software **Jet the middleware** is a bit **unuseful** to the end user.

Here we'd like to show some stuff already working that can give you a spin to get into development on this box.

When you see a program with application embedded (like many italian national services), you could see in the virtual machine logs, the downloading of the files and, after that, the launch of the autostart application.

Many applications will crash with supported in Jet are quite slim (albeit quite complete and functiona); see the **Jet Developer Manual** for a complete description.

By the way, to get the virtual machine logs through a telnet session, follow the indication written in **Restart the decoder manager graphical application** paragraph.

Here you can find the print out of a succesfully decoder carousel filesystem and the trial to launch the autostart application.

Here you'll find the tree of the decoded filesystem.



Note that we are browsing the carousel filesystem, through a local linux computer that's mounting the decoder filesystem using an ftp sessions and fuse (see [curlftps](#) package)

ClassNotFoundException because the Java API

```
Sessione Modifica Visualizza Segnalibri Impostazioni Aiuto
loading carousel: id 1100, pid 4100, component 100, cache size 100, directory /tmp/
java.awt.MWGraphics[0,0]asked to constrain to 0,0,,720,576
paint show! serviceid is 17
load carousel done
DSMCCMonitor exit
AltMonitor started
Aitpid is 3100
add pid to filtering: pid 3100, table id 116
fd number of '/dev/dvb/card0/demux0' is 0
read table filtering
Ait monitor parse new version ait
---
organization id: 11
application id: 84
application control code: 2
transport protocol component tag: 100
application name: EP6_Dati
dvb-j descriptor params:
dvb-j location descriptor:
application base dir: /
application classpath:
application classname: NULL
xlet dir: /tmp/services/17/
class loading:NULL
loadXlet error: java.lang.ClassNotFoundException: NULL
```

```
Sessione Modifica Visualizza Segnalibri Impostazioni Aiuto
andrea@nb-venturi:~/jet/var/jtvos$ cd ../../
andrea@nb-venturi:~/jet$ tree tmp
tmp
-- carousels
-- 4100
-- 1100
-- fil-11-30303100
-- fil-11-30303100.version
-- fil-12-30303200
-- fil-12-30303200.version
-- fil-12-30303300
-- fil-12-30303300.version
-- fil-13-30303400
-- fil-13-30303400.version
-- fil-14-30303500
-- fil-14-30303500.version
-- fil-14-30303600
-- fil-14-30303600.version
-- fil-14-30303700
-- fil-14-30303700.version
-- fil-15-30303800
-- fil-15-30303800.version
-- fil-15-30303900
-- fil-15-30303900.version
-- fil-16-30304100
-- fil-16-30304100.version
-- srg-10-53475700
-- banners.zip -> ../../../../../../tmp/carousels/4100/1100/fil-11-30303100
-- d0.zip -> ../../../../../../tmp/carousels/4100/1100/fil-16-30304100
-- d1.zip -> ../../../../../../tmp/carousels/4100/1100/fil-15-30303900
-- d2.zip -> ../../../../../../tmp/carousels/4100/1100/fil-15-30303800
-- d3.zip -> ../../../../../../tmp/carousels/4100/1100/fil-14-30303700
-- d4.zip -> ../../../../../../tmp/carousels/4100/1100/fil-14-30303500
-- d5.zip -> ../../../../../../tmp/carousels/4100/1100/fil-12-30303300
-- d6.zip -> ../../../../../../tmp/carousels/4100/1100/fil-12-30303200
-- p.zip -> ../../../../../../tmp/carousels/4100/1100/fil-14-30303600
-- pics.zip -> ../../../../../../tmp/carousels/4100/1100/fil-13-30303400
-- srg-10-53475700.version
-- 7209
-- 7009
-- fil-11-30303100
-- fil-11-30303100.version
-- srg-10-53475700
-- banners.zip -> ../../../../../../tmp/carousels/7209/7009/fil-11-30303100
-- d0.zip -> ../../../../../../tmp/carousels/7209/7009/fil-16-30304100
-- d1.zip -> ../../../../../../tmp/carousels/7209/7009/fil-15-30303900
-- d2.zip -> ../../../../../../tmp/carousels/7209/7009/fil-15-30303800
```

## Copy recorded features to a PC using LAN



The standard recording done with Jet are the same transport streams got from the air, without any modification or transcoding

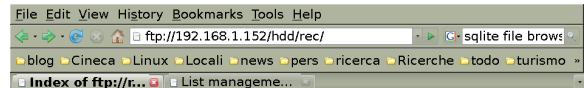
You can copy these streams **for personal use** from the decoder to a PC and see it like when they were publicly broadcasted.

The easiest way to copy files is using the embedded ftp server, if you have Mozilla Firefox and knows the decoder ip address, you could simply type on the URL field:

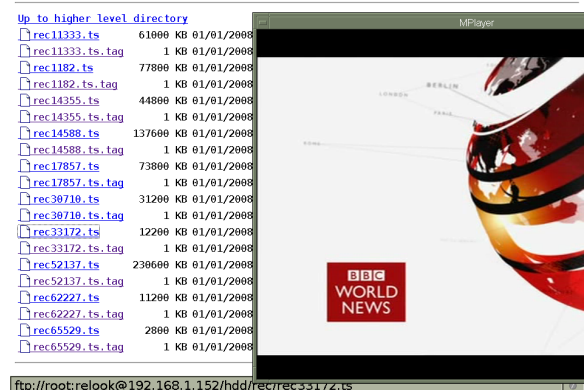
<ftp://root:relook@IP.ADD.RE.SS/hdd/rec/>

Please change **IP.ADD.RE.SS** accordingly to you local network setup.

Each recXXXX.ts file show a companion .tag file with the meta-data of the registration (if any) available, like event name, time and date, service name.



### Index of ftp://root@192.168.1.152/hdd/rec/

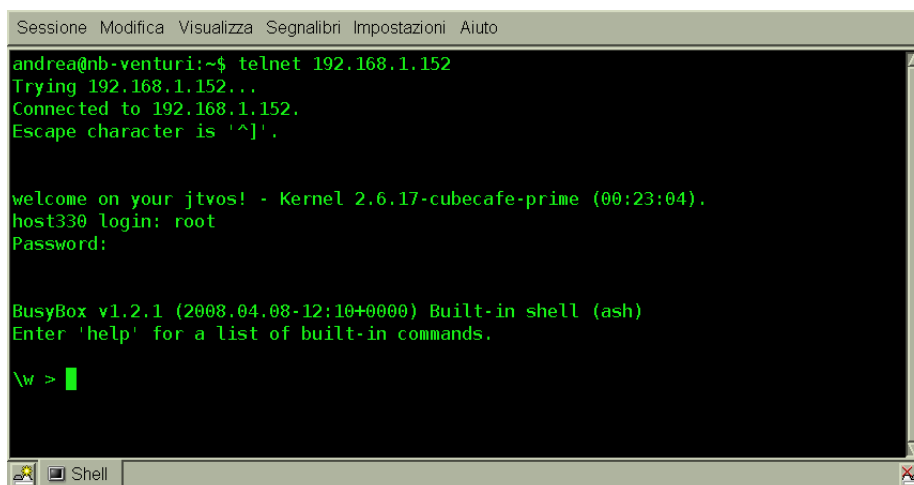


## Telnet access to decoder operative system

In this chapter, we'll show some details of the inside machinery of the Jet middleware.



They are good for you to know, so you can get better understand what's going on when you try some feature, and maybe you'll get more juice from the box, if you carefully exploit it.



To get inside the box, you'll need a some more setup:

- a local network (LAN) properly configured
- the STB to get an ip address (with DHCP or with zeroconf)
- a PC configured on the same LAN

After the physical connection, you should get the ip address from the user interface (look in **System Configuration** chapter) using the telnet on the PC like:

#### Telnet <ip address>

In this showed example, the ip address is 192.168.1.152.

The user is root, and the password is relook (a legacy of the firmware we are buiding upon..)

Now that you are in, you can browse in the directory tree with the standard Linux command.

Here you'll find some standard task you'd like to do, to understand if things are correctly set up.

**Q:** How to check if the hard disk is correctly mounted:

**A:** do this command: **df**

```
\w > df
```

| Filesystem                             | 1k-blocks | Used    | Available | Use%    | Mounted on |
|----------------------------------------|-----------|---------|-----------|---------|------------|
| /dev/root                              | 3392      | 3392    | 0         | 100%    | /          |
| /dev/mtdblock/1                        | 1728      | 324     | 1404      | 19%     | /var       |
| /dev/ide/host0/bus0/target0/lun0/part4 |           | 3587428 | 671580    | 2736440 |            |
| 20% /hdd                               |           |         |           |         |            |

As you can see, on the third line, there's "something" mounted over /hdd . This is your hard disk. Inside you could find the recorded stream, for example:

```
\w > ls -l /hdd/rec/rec*.ts
```

```
-rw-r--r--  1 root  root    62464000 Jan  1 00:20 /hdd/rec/rec11333.ts
-rw-r--r--  1 root  root    79667200 Jan  1 00:17 /hdd/rec/rec1182.ts
-rw-r--r--  1 root  root    45875200 Jan  1 00:18 /hdd/rec/rec14355.ts
-rw-r--r--  1 root  root   140902400 Jan  1 02:33 /hdd/rec/rec14588.ts
-rw-r--r--  1 root  root    75571200 Jan  1 00:20 /hdd/rec/rec17857.ts
-rw-r--r--  1 root  root    31948800 Jan  1 00:20 /hdd/rec/rec30710.ts
-rw-r--r--  1 root  root   236134400 Jan  1 00:47 /hdd/rec/rec52137.ts
-rw-r--r--  1 root  root    11468800 Jan  1 00:21 /hdd/rec/rec62227.ts
-rw-r--r--  1 root  root     2867200 Jan  1 01:45 /hdd/rec/rec65529.ts
```

Another very interesting directory is **/var/jtvos** where you can find all the local configuration files:

## ***Bring the decoder to factory default***



If you tweak too much the decoder config, especially using the telnet interface, you could get to an unpredictable status and would like to recover back to a fresh start.

You do have two options here:

### **Light: clear all the variables**

Follow these steps and then reboot

- Telnet into the decoder
- Stop the decoder manager (the graphic application) to clear resources and db  
**killall cvm**
- Delete these files:
  - **currentLanguage: `rm /var/jtvos/currentLanguage`**
- Reset all the databases:
  - **`cp /var/jtvos/services-default /var/jtvos/services`**
  - **`cp /var/jtvos/events-default /var/jtvos/events`**
- Now you could reboot or relaunch the graphical application
  - `/java/bin/cvm -cp /var/jtvos:/java/jtvos -Djava.library.path=/var/jtvos:/java/jtvos StbMain Relook210`

That's all, on the tv you should see the wizard beginning to ask you some simple questions and doing the first time service search.

### **Strong: reinstall a clean image**

With this option, you should get to a really pristine (loosing any added software or valuable data, pay attention..). You should check the first time installation manual and follow carefully that procedure. You'll need a known good image, a pc with a serial cable and some spare time: it takes something like 20 minutes from start to end.

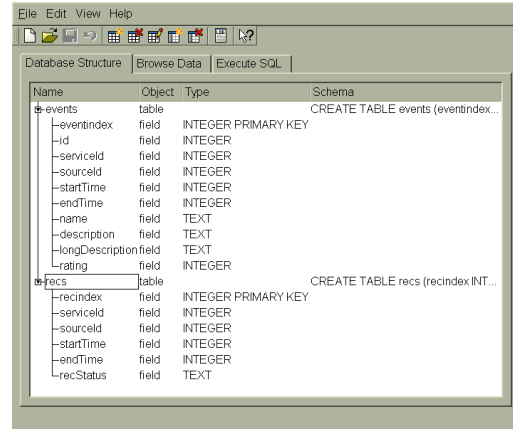
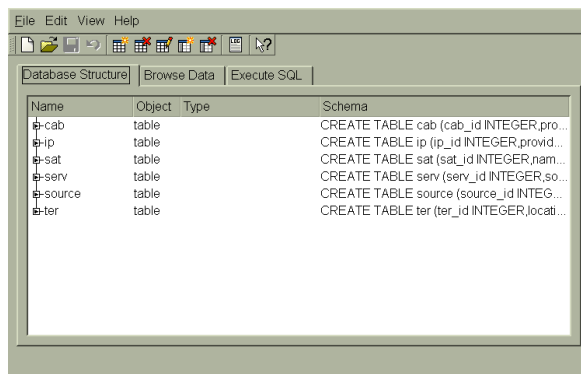
### ***Browse the decoder databases***

Inside the decoder, you can find two main databases, one containing all the known network and **services** (slowly put together during previous frequency scans), the other containing **events** and scheduled recordings.

The databases are simple files made with [sqlite](#), a public domain light and simple sql database. You can browse the databases using [sqlitebrowser](#).

Here some screenshots showing the database tables and structures:

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### ***Restart the decoder manager graphical application***

If the decoder doesn't answer when pressing the remote keys, it could be crashed completely or you could have just a problem in the graphical application.

In the former case, you shouldn't be able to ping it from the network; it's dead!

When it happens (and it happens..), you can easily restart the box from a cold start: if you have a CubeCafe Prime, you can turn off and on the switch on the back near the power cord, if you have a 250S you have to unplug the power cord from the main.



Please notify us to [jet-support@avalpa.com](mailto:jet-support@avalpa.com) if you can reproduce this bad behaviour in a deterministic way, we could try to trace the case and fix the problem.

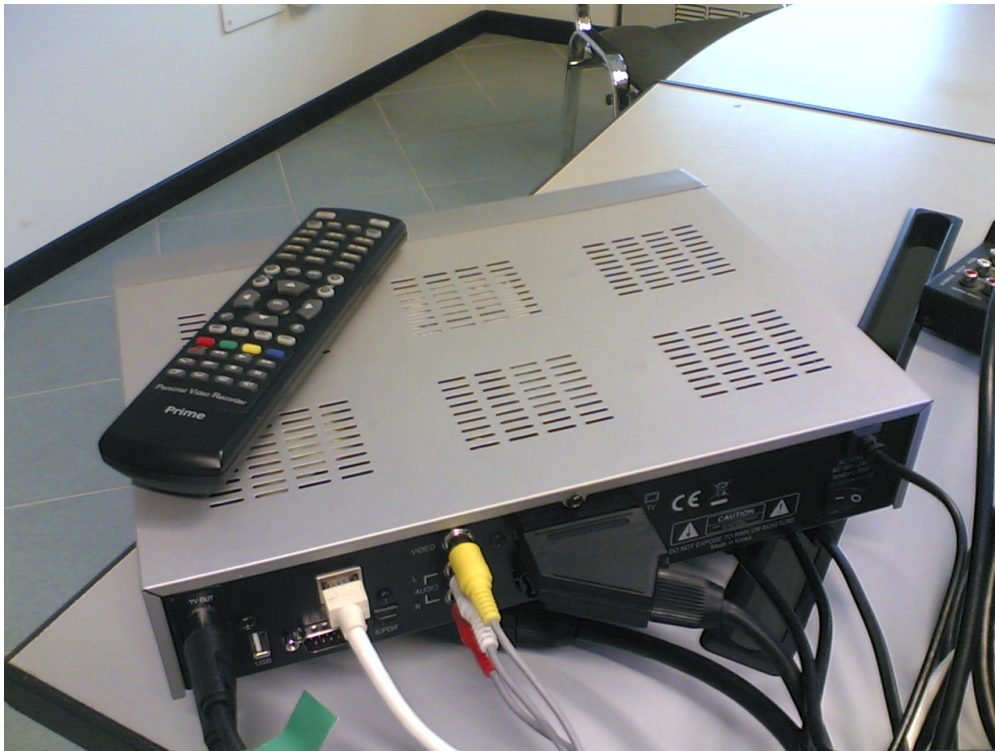
In the latter case, you should be able to enter the decoder via telnet and relaunch the graphical application with this command:

```
/java/bin/cvm -cp /var/jtvos:/java/jtvos -Djava.library.path=/var/jtvos:/java/jtvos StbMain Relook210
```

You could decide to kill the GA by choice, for example if you want to test different libraries and advanced configurations: please read the **Jet developer manual**.

## Appendix A: decoder connection

Here you can see the back of the decoder with some description of the cable to be connected to have a right setup.



From left to right you can find these cables:

- Antenna In (the cable from the wall)
- Antenna Out (to tv set)
- Ethernet jack for internet connection (optional)
- three RCA cable
  - Yellow: video composite output (to tv, videocamera or VCR)
  - White/Red: analog audio left and right output (to tv, videocamera or VCR)
- Scart Output (Top port to television, bottom to VCR)
- Power cable to wall 220V

You can see also some more ports for advanced uses, in this picture they are not used.

- Usb 1.1 port, for optional devices (this is a Cubecafe Prime 350)
- Serial port RS232 ( for debugging and maintenance)
- SPDIF digital audio output (to external amplifier, for complex audio setup)

## Appendix B: Remote control

Here you'll find a description of the keys present on a CubeCafe Prime 350 (the keys in the 250 are a bit different, mainly for advanced features).

Actually Jet software does not support all the keys. So in future versions, there could be more to add.

| Key               | Description                                                                                                                                                                                      |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power             | <p>On the upper left you'll find the power button.</p> <p>Pressing it briefly will put in stand by the decoder.</p> <p>Pressing it for more the 4 seconds will power off the decoder hardly.</p> |
| Arrows            | <p>In the middle of the remote there are the four arrow keys, they are useful quite always to move up and down or back and forward in the Menu</p>                                               |
| OK                | <p>In the center of the arrows there's an OK button to accept choices</p>                                                                                                                        |
| Menu              | <p>On the top left of the up arrows there's the Menu button, useful for call the decoder Menu</p>                                                                                                |
| Exit              | <p>This is a key used for:</p> <ul style="list-style-type: none"><li>● escape wrong selections,</li><li>● stop playback</li><li>● exit interactive applications</li></ul>                        |
| <i>i</i> (Info)   | <p>Between Right and Down Arrows, there's the <i>i</i> key; it's used to get Info about events.</p>                                                                                              |
| <b>Red Button</b> | <p>This is useful to start immediate recording of a programs.</p>                                                                                                                                |



## Appendix C: Frequently Asked Questions

Here you can find the more often asked questions. A lot are related to behaviour we are going to fix (FIX), others are referring to decision by design.

**Q:** I can't change the program/service through the up/down keys on the front panel. Why?

**A:** They keys of the front panel are replicating the same keys on the remote control, so if you want to move to next service you need to press the **OK button** to get to the **Service list** menu. On the remote you could use the quicker keys **P/Pg**.

**Q:** The power off button is not working on the decoder and on the remote.

**A:** It's actually unsupported (**TO BE FIXED**).

**Q:** If i keep pressed an arrow key, i don't see the selection going down or up continuously.

**A:** Actually the repeat key function doesn't work (**TO BE FIXED**)

**Q:** I have a problem unresolved or a question unanswered, how can i do?

**A:** Please write us to [jet-support@avalpa.com](mailto:jet-support@avalpa.com) and we'll try to help you (and FIX the FAQ!)

## Appendix D: acronyms, glossary and references

The most frequent acronyms and something about it

DVB: Digital Video Broadcast, usually means the standard for digital television (<http://www.dvb.org> )

ETSI: European Telecommunications Standards Institute, the standardization body for many digital television standards (<http://www.etsi.org> )

MHP: Multimedia Home Platform, the ETSI standard for interactive television (<http://www.mhp.org> )

MPEG: Motion Pictures Expert Group, a working group (lead by Leonardo Chiariglione) who has been working on some great stuff for digital television. Like the video codec MPEG2 and MPEG4/H264 who can get this digital tv feasible.

STB: Set Top Box, the decoder.

TS: Transport Stream, the container of digital television stream

## Appendix D: Frequency table for digital terrestrial italian nets

Courtesy of [http://www.maritv.net/canali\\_frequenze.htm](http://www.maritv.net/canali_frequenze.htm)

| Canale     | da Mhz | a Mhz | portante banda | video MHz | equivalenze | sottoportante colore MHz | sottoportante audio (mono) MHz | freq. |
|------------|--------|-------|----------------|-----------|-------------|--------------------------|--------------------------------|-------|
| E1         | 40     | 47    | 41,25          | 45,68     | 46,75       | 43,5                     | VHF 1                          |       |
| E2 (basso) |        | 46    | 53             | 46,25     | 50,68       | 51,75                    | 49,5                           | VHF 1 |
| E2         | 47     | 54    | 48,25          | 52,68     | 53,75       | 50,5                     | VHF 1                          | 1     |
| R1/E2A     | 48,5   | 55,5  | 49,75          | 54,18     | 55,25       | 52                       | VHF 1                          | 2     |
| A          | 52,5   | 59,5  | 53,75          | 58,18     | 59,25       | 56                       | VHF 1                          | 13    |
| E3         | 54     | 61    | 55,25          | 59,68     | 60,75       | 57,5                     | VHF 1                          | 3     |
| R2         | 58     | 65    | 59,25          | 63,68     | 64,75       | 61,5                     | VHF 1                          | 79    |
| B/E4       | 61     | 68    | 62,25          | 66,68     | 67,75       | 64,5                     | VHF 1                          | 4/14  |
| X          | 68     | 75    | 69,25          | 73,68     | 74,75       | 71,5                     | CATV                           | 74    |
| Y          | 75     | 82    | 76,25          | 80,68     | 81,75       | 78,5                     | CATV                           | 75    |
| C          | 81     | 88    | 82,25          | 86,68     | 87,75       | 84,5                     | VHF 2                          | 15    |
| Z          | 82     | 89    | 83,25          | 87,68     | 88,75       | 85,5                     | CATV                           | 76    |
| Z+1        | 89     | 96    | 90,25          | 94,68     | 95,75       | 92,5                     | CATV                           | 77    |
| ZZ         | 92     | 99    | 93,25          | 97,68     | 98,75       | 95,5                     | CATV                           | 80    |
| Z+2        | 96     | 103   | 97,25          | 101,68    | 102,75      | 99,5                     | CATV                           | 78    |
| S1         | 104    | 111   | 105,25         | 109,68    | 110,75      | 107,5                    | CATV                           | 81    |
| S2         | 111    | 118   | 112,25         | 116,68    | 117,75      | 114,5                    | CATV                           | 82    |
| S3         | 118    | 125   | 119,25         | 123,68    | 124,75      | 121,5                    | CATV                           | 83    |
| S4         | 125    | 132   | 126,25         | 130,68    | 131,75      | 128,5                    | CATV                           | 84    |
| S5         | 132    | 139   | 133,25         | 137,68    | 138,75      | 135,5                    | CATV                           | 85    |
| S6         | 139    | 146   | 140,25         | 144,68    | 145,75      | 142,5                    | CATV                           | 86    |
| S7         | 146    | 153   | 147,25         | 151,68    | 152,75      | 149,5                    | CATV                           | 87    |
| S8         | 153    | 160   | 154,25         | 158,68    | 159,75      | 156,5                    | CATV                           | 88    |
| S9         | 160    | 167   | 161,25         | 165,68    | 166,75      | 163,5                    | CATV                           | 89    |
| S10        | 167    | 174   | 168,25         | 172,68    | 173,75      | 170,5                    | CATV                           | 90/D  |
| D/E5       | 174    | 181   | 175,25         | 179,68    | 180,75      | 177,5                    | VHF 3                          | 5/16  |
| E6         | 181    | 188   | 182,25         | 186,68    | 187,75      | 184,5                    | VHF 3                          | 6     |
| E          | 182,5  | 189,5 | 183,75         | 188,18    | 189,25      | 186                      | VHF 3                          | 17    |
| E7         | 188    | 195   | 189,25         | 193,68    | 194,75      | 191,5                    | VHF 3                          | 7     |
| F          | 191    | 198   | 192,25         | 196,68    | 197,75      | 194,5                    | VHF 3                          | 18    |
| E8         | 195    | 202   | 196,25         | 200,68    | 201,75      | 198,5                    | VHF 3                          | 8     |
| G          | 200    | 207   | 201,25         | 205,68    | 206,75      | 203,5                    | VHF 3                          | 19    |
| E9         | 202    | 209   | 203,25         | 207,68    | 208,75      | 205,5                    | VHF 3                          | 9     |
| H/E10      | 209    | 216   | 210,25         | 214,68    | 215,75      | 212,5                    | VHF 3                          | 10/20 |

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|        |     |     |        |        |        |       |       |           |
|--------|-----|-----|--------|--------|--------|-------|-------|-----------|
| H1/E11 | 216 | 223 | 217,25 | 221,68 | 222,75 | 219,5 | VHF 3 | 11        |
| H2/E12 | 223 | 230 | 224,25 | 228,68 | 229,75 | 226,5 | VHF 3 | 12        |
| S11    | 230 | 237 | 231,25 | 235,68 | 236,75 | 233,5 | CATV  | 91/H3     |
| S12    | 237 | 244 | 238,25 | 242,68 | 243,75 | 240,5 | CATV  | 92/H4     |
| S13    | 244 | 251 | 245,25 | 249,68 | 250,75 | 247,5 | CATV  | 93/H5     |
| S14    | 251 | 258 | 252,25 | 256,68 | 257,75 | 254,5 | CATV  | 94/H6     |
| S15    | 258 | 265 | 259,25 | 263,68 | 264,75 | 261,5 | CATV  | 95/H7     |
| S16    | 265 | 272 | 266,25 | 270,68 | 271,75 | 268,5 | CATV  | 96/H8     |
| S17    | 272 | 279 | 273,25 | 277,68 | 278,75 | 275,5 | CATV  | 97/H9     |
| S18    | 279 | 286 | 280,25 | 284,68 | 285,75 | 282,5 | CATV  | 98/H10    |
| S19    | 286 | 293 | 287,25 | 291,68 | 292,75 | 289,5 | CATV  | 99/H11    |
| S20    | 293 | 300 | 294,25 | 298,68 | 299,75 | 296,5 | CATV  | 00/H12    |
| S21    | 302 | 310 | 303,25 | 307,68 | 308,75 | 306   | CATV  | iperbanda |
| S22    | 310 | 318 | 311,25 | 315,68 | 316,75 | 314   | CATV  | iperbanda |
| S23    | 318 | 326 | 319,25 | 323,68 | 324,75 | 322   | CATV  | iperbanda |
| S24    | 326 | 334 | 327,25 | 331,68 | 332,75 | 330   | CATV  | iperbanda |
| S25    | 334 | 342 | 335,25 | 339,68 | 340,75 | 338   | CATV  | iperbanda |
| S26    | 342 | 350 | 343,25 | 347,68 | 348,75 | 346   | CATV  | iperbanda |
| S27    | 350 | 358 | 351,25 | 355,68 | 356,75 | 354   | CATV  | iperbanda |
| S28    | 358 | 366 | 359,25 | 363,68 | 364,75 | 362   | CATV  | iperbanda |
| S29    | 366 | 374 | 367,25 | 371,68 | 372,75 | 370   | CATV  | iperbanda |
| S30    | 374 | 382 | 375,25 | 379,68 | 380,75 | 378   | CATV  | iperbanda |
| S31    | 382 | 390 | 383,25 | 387,68 | 388,75 | 386   | CATV  | iperbanda |
| S32    | 390 | 398 | 391,25 | 395,68 | 396,75 | 394   | CATV  | iperbanda |
| S33    | 398 | 406 | 399,25 | 403,68 | 404,75 | 402   | CATV  | iperbanda |
| S34    | 406 | 414 | 407,25 | 411,68 | 412,75 | 410   | CATV  | iperbanda |
| S35    | 414 | 422 | 415,25 | 419,68 | 420,75 | 418   | CATV  | iperbanda |
| S36    | 422 | 430 | 423,25 | 427,68 | 428,75 | 426   | CATV  | iperbanda |
| S37    | 430 | 438 | 431,25 | 435,68 | 436,75 | 434   | CATV  | iperbanda |
| S38    | 438 | 446 | 439,25 | 443,68 | 444,75 | 442   | CATV  | iperbanda |
| S39    | 446 | 454 | 447,25 | 451,68 | 452,75 | 450   | CATV  | iperbanda |
| S40    | 454 | 462 | 455,25 | 459,68 | 460,75 | 458   | CATV  | iperbanda |
| S41    | 462 | 470 | 463,25 | 467,68 | 468,75 | 466   | CATV  | iperbanda |
| 21     | 470 | 478 | 471,25 | 475,68 | 476,75 | 474   | UHF 4 |           |
| 22     | 478 | 486 | 479,25 | 483,68 | 484,75 | 482   | UHF 4 |           |
| 23     | 486 | 494 | 487,25 | 491,68 | 492,75 | 490   | UHF 4 |           |
| 24     | 494 | 502 | 495,25 | 499,68 | 500,75 | 498   | UHF 4 |           |
| 25     | 502 | 510 | 503,25 | 507,68 | 508,75 | 506   | UHF 4 |           |
| 26     | 510 | 518 | 511,25 | 515,68 | 516,75 | 514   | UHF 4 |           |
| 27     | 518 | 526 | 519,25 | 523,68 | 524,75 | 522   | UHF 4 |           |

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|    |     |     |        |        |        |     |       |
|----|-----|-----|--------|--------|--------|-----|-------|
| 28 | 526 | 534 | 527,25 | 531,68 | 532,75 | 530 | UHF 4 |
| 29 | 534 | 542 | 535,25 | 539,68 | 540,75 | 538 | UHF 4 |
| 30 | 542 | 550 | 543,25 | 547,68 | 548,75 | 546 | UHF 4 |
| 31 | 550 | 558 | 551,25 | 555,68 | 556,75 | 554 | UHF 4 |
| 32 | 558 | 566 | 559,25 | 563,68 | 564,75 | 562 | UHF 4 |
| 33 | 566 | 574 | 567,25 | 571,68 | 572,75 | 570 | UHF 4 |
| 34 | 574 | 582 | 575,25 | 579,68 | 580,75 | 578 | UHF 4 |
| 35 | 582 | 590 | 583,25 | 587,68 | 588,75 | 586 | UHF 4 |
| 36 | 590 | 598 | 591,25 | 595,68 | 596,75 | 594 | UHF 4 |
| 37 | 598 | 606 | 599,25 | 603,68 | 604,75 | 602 | UHF 5 |
| 38 | 606 | 614 | 607,25 | 611,68 | 612,75 | 610 | UHF 5 |
| 39 | 614 | 622 | 615,25 | 619,68 | 620,75 | 618 | UHF 5 |
| 40 | 622 | 630 | 623,25 | 627,68 | 628,75 | 626 | UHF 5 |
| 41 | 630 | 638 | 631,25 | 635,68 | 636,75 | 634 | UHF 5 |
| 42 | 638 | 646 | 639,25 | 643,68 | 644,75 | 642 | UHF 5 |
| 43 | 646 | 654 | 647,25 | 651,68 | 652,75 | 650 | UHF 5 |
| 44 | 654 | 662 | 655,25 | 659,68 | 660,75 | 658 | UHF 5 |
| 45 | 662 | 670 | 663,25 | 667,68 | 668,75 | 666 | UHF 5 |
| 46 | 670 | 678 | 671,25 | 675,68 | 676,75 | 674 | UHF 5 |
| 47 | 678 | 686 | 679,25 | 683,68 | 684,75 | 682 | UHF 5 |
| 48 | 686 | 694 | 687,25 | 691,68 | 692,75 | 690 | UHF 5 |
| 49 | 694 | 702 | 695,25 | 699,68 | 700,75 | 698 | UHF 5 |
| 50 | 702 | 710 | 703,25 | 707,68 | 708,75 | 706 | UHF 5 |
| 51 | 710 | 718 | 711,25 | 715,68 | 716,75 | 714 | UHF 5 |
| 52 | 718 | 726 | 719,25 | 723,68 | 724,75 | 722 | UHF 5 |
| 53 | 726 | 734 | 727,25 | 731,68 | 732,75 | 730 | UHF 5 |
| 54 | 734 | 742 | 735,25 | 739,68 | 740,75 | 738 | UHF 5 |
| 55 | 742 | 750 | 743,25 | 747,68 | 748,75 | 746 | UHF 5 |
| 56 | 750 | 758 | 751,25 | 755,68 | 756,75 | 754 | UHF 5 |
| 57 | 758 | 766 | 759,25 | 763,68 | 764,75 | 762 | UHF 5 |
| 58 | 766 | 774 | 767,25 | 771,68 | 772,75 | 770 | UHF 5 |
| 59 | 774 | 782 | 775,25 | 779,68 | 780,75 | 778 | UHF 5 |
| 60 | 782 | 790 | 783,25 | 787,68 | 788,75 | 786 | UHF 5 |
| 61 | 790 | 798 | 791,25 | 795,68 | 796,75 | 794 | UHF 5 |
| 62 | 798 | 806 | 799,25 | 803,68 | 804,75 | 802 | UHF 5 |
| 63 | 806 | 814 | 807,25 | 811,68 | 812,75 | 810 | UHF 5 |
| 64 | 814 | 822 | 815,25 | 819,68 | 820,75 | 818 | UHF 5 |
| 65 | 822 | 830 | 823,25 | 827,68 | 828,75 | 826 | UHF 5 |
| 66 | 830 | 838 | 831,25 | 835,68 | 836,75 | 834 | UHF 5 |
| 67 | 838 | 846 | 839,25 | 843,68 | 844,75 | 842 | UHF 5 |

## Jet user manual

|    |      |      |         |         |         |      |                   |                                |
|----|------|------|---------|---------|---------|------|-------------------|--------------------------------|
| 68 | 846  | 854  | 847,25  | 851,68  | 852,75  | 850  | UHF 5             |                                |
| 69 | 854  | 862  | 855,25  | 859,68  | 860,75  | 858  | UHF 5             |                                |
| 70 | 862  | 870  | 863,25  | 867,68  | 868,75  | 866  | UHF fuori banda 5 | raramente utilizzato in Italia |
| 71 | 870  | 878  | 871,25  | 875,68  | 876,75  | 874  | UHF fuori banda 5 | non più utilizzato in Italia   |
| 72 | 878  | 886  | 879,25  | 883,68  | 884,75  | 882  | UHF fuori banda 5 | non più utilizzato in Italia   |
| 73 | 886  | 894  | 887,25  | 891,68  | 892,75  | 890  | UHF fuori banda 5 | non più utilizzato in Italia   |
| 74 | 894  | 902  | 895,25  | 899,68  | 900,75  | 898  | UHF fuori banda 5 | non più utilizzato in Italia   |
| 75 | 902  | 910  | 903,25  | 907,68  | 908,75  | 906  | UHF fuori banda 5 | non più utilizzato in Italia   |
| 76 | 910  | 918  | 911,25  | 915,68  | 916,75  | 914  | UHF fuori banda 5 | non più utilizzato in Italia   |
| 77 | 918  | 926  | 919,25  | 923,68  | 924,75  | 922  | UHF fuori banda 5 | non più utilizzato in Italia   |
| 78 | 926  | 934  | 927,25  | 931,68  | 932,75  | 930  | UHF fuori banda 5 | non più utilizzato in Italia   |
| 79 | 934  | 942  | 935,25  | 939,68  | 940,75  | 938  | UHF fuori banda 5 | non più utilizzato in Italia   |
| 80 | 942  | 950  | 943,25  | 947,68  | 948,75  | 946  | UHF fuori banda 5 | non più utilizzato in Italia   |
| 81 | 950  | 958  | 951,25  | 955,68  | 956,75  | 954  | UHF fuori banda 5 | non più utilizzato in Italia   |
| 82 | 958  | 966  | 959,25  | 963,68  | 964,75  | 962  | UHF fuori banda 5 | non più utilizzato in Italia   |
| 83 | 966  | 974  | 967,25  | 971,68  | 972,75  | 970  | UHF fuori banda 5 | non più utilizzato in Italia   |
| 84 | 974  | 982  | 975,25  | 979,68  | 980,75  | 978  | UHF fuori banda 5 | non più utilizzato in Italia   |
| 85 | 982  | 990  | 983,25  | 987,68  | 988,75  | 986  | UHF fuori banda 5 | non più utilizzato in Italia   |
| 86 | 990  | 998  | 991,25  | 995,68  | 996,75  | 994  | UHF fuori banda 5 | non più utilizzato in Italia   |
| 87 | 998  | 1006 | 999,25  | 1003,68 | 1004,75 | 1002 | UHF fuori banda 5 | non più utilizzato in Italia   |
| 88 | 1006 | 1014 | 1007,25 | 1011,68 | 1012,75 | 1010 | UHF fuori banda 5 | non più utilizzato in Italia   |
| 89 | 1014 | 1022 | 1015,25 | 1019,68 | 1020,75 | 1018 | UHF fuori banda 5 | non più utilizzato in Italia   |
| 90 | 1022 | 1030 | 1023,25 | 1027,68 | 1028,75 | 1026 | UHF fuori banda 5 | non più utilizzato in Italia   |
| 91 | 1030 | 1038 | 1031,25 | 1035,68 | 1036,75 | 1034 | UHF fuori banda 5 | non più utilizzato in Italia   |
| 92 | 1038 | 1046 | 1039,25 | 1043,68 | 1044,75 | 1042 | UHF fuori banda 5 | non più utilizzato in Italia   |
| 93 | 1046 | 1054 | 1047,25 | 1051,68 | 1052,75 | 1050 | UHF fuori banda 5 | non più utilizzato in Italia   |
| 94 | 1054 | 1062 | 1055,25 | 1059,68 | 1060,75 | 1058 | UHF fuori banda 5 | non più utilizzato in Italia   |
| 95 | 1062 | 1070 | 1063,25 | 1067,68 | 1068,75 | 1066 | UHF fuori banda 5 | non più utilizzato in Italia   |
| 96 | 1070 | 1078 | 1071,25 | 1075,68 | 1076,75 | 1074 | UHF fuori banda 5 | non più utilizzato in Italia   |
| 97 | 1078 | 1086 | 1079,25 | 1083,68 | 1084,75 | 1082 | UHF fuori banda 5 | non più utilizzato in Italia   |
| 98 | 1086 | 1094 | 1087,25 | 1091,68 | 1092,75 | 1090 | UHF fuori banda 5 | non più utilizzato in Italia   |
| 99 | 1094 | 1102 | 1095,25 | 1099,68 | 1100,75 | 1098 | UHF fuori banda 5 | non più utilizzato in Italia   |